Unit 15
Day 4
Integer Roots

Fundamental theorem of Algebra:

Every polynomial of degree 1 or more has at least one complex zero (root).

Number of zeros theorem:

A polynomial of degree **n** has at most **n** distinct zeros.

Find the integral roots (zeros, solutions):

1) $P(x)=x^3+3x^2-25x-75$

# of possible zeros: 3

possible integer zeros: $\cancel{\pm 1}, \pm 3, \pm 5, \pm 15, \pm 25, \pm 75$

	1	3	-25	-75
1	1	4	-21	-96
-1	1	2	-27	-48
3	1	6	-7	-96
-3	1	0	-25	0 ✓

-3, 5, -5

$P(x)=(x+3)(x^2-25)=(x+3)(x-5)(x+5)$

NOTE: The integral zeros must be factors of the constant.

2) $x^4 - 11x^2 - 18x - 8 = 0$

# of possible solutions:

possible integer solutions:

3) $f(x) = x^4 - 6x^3 + 10x^2 + 2x - 15$

\# of possible roots: 4

possible integer roots: $\pm 1, \pm 3, \pm 5, \pm 15$

	1	-6	10	2	-15
1	1	-5	5	7	-8
-1	1	-7	17	-15	0

$f(x) = (x+1)(x^3 - 7x^2 + 17x - 15)$

	1	-7	+17	-15
-1	1	-8	25	-40
3	1	-4	5	0

$f(x) = (x+1)(x-3)(x^2 - 4x + 5)$

$a=1 \quad b=-4 \quad c=5$

$$X = \frac{4 \pm \sqrt{16 - 4(5)(1)}}{2}$$

HW Wksht 1-8 all

$$x = \frac{4 \pm \sqrt{16-20}}{2} = \frac{4 \pm 2i}{2} = 2 \pm i, -1, 3$$